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**ENVIRONMENTAL MANAGEMENT**

**8291/21**

Paper 2 Hydrosphere and Biosphere

**October/November 2016**

**1 hour 30 minutes**

Additional Materials: Answer Booklet/Paper

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name on all the work you hand in.  
Write in dark blue or black pen.  
You may use an HB pencil for any diagrams or graphs.  
Do not use staples, paper clips, glue or correction fluid.  
**DO NOT WRITE IN ANY BARCODES.**

Electronic calculators may be used.  
You may lose marks if you do not show your working or if you do not use appropriate units.

**Section A**

Answer **all** questions in this section.  
Write your answers in the spaces provided on the question paper.

**Section B**

Answer **one** question from this section.  
Write your answers on the separate answer paper provided.

At the end of the examination,

1. fasten all separate answer paper securely to the question paper;
2. enter the question number from Section B in the grid opposite.

|                  | For<br>Examiner's<br>Use |
|------------------|--------------------------|
| <b>Section A</b> | /                        |
| 1                |                          |
| 2                |                          |
| <b>Section B</b> | /                        |
|                  |                          |
| <b>Total</b>     |                          |

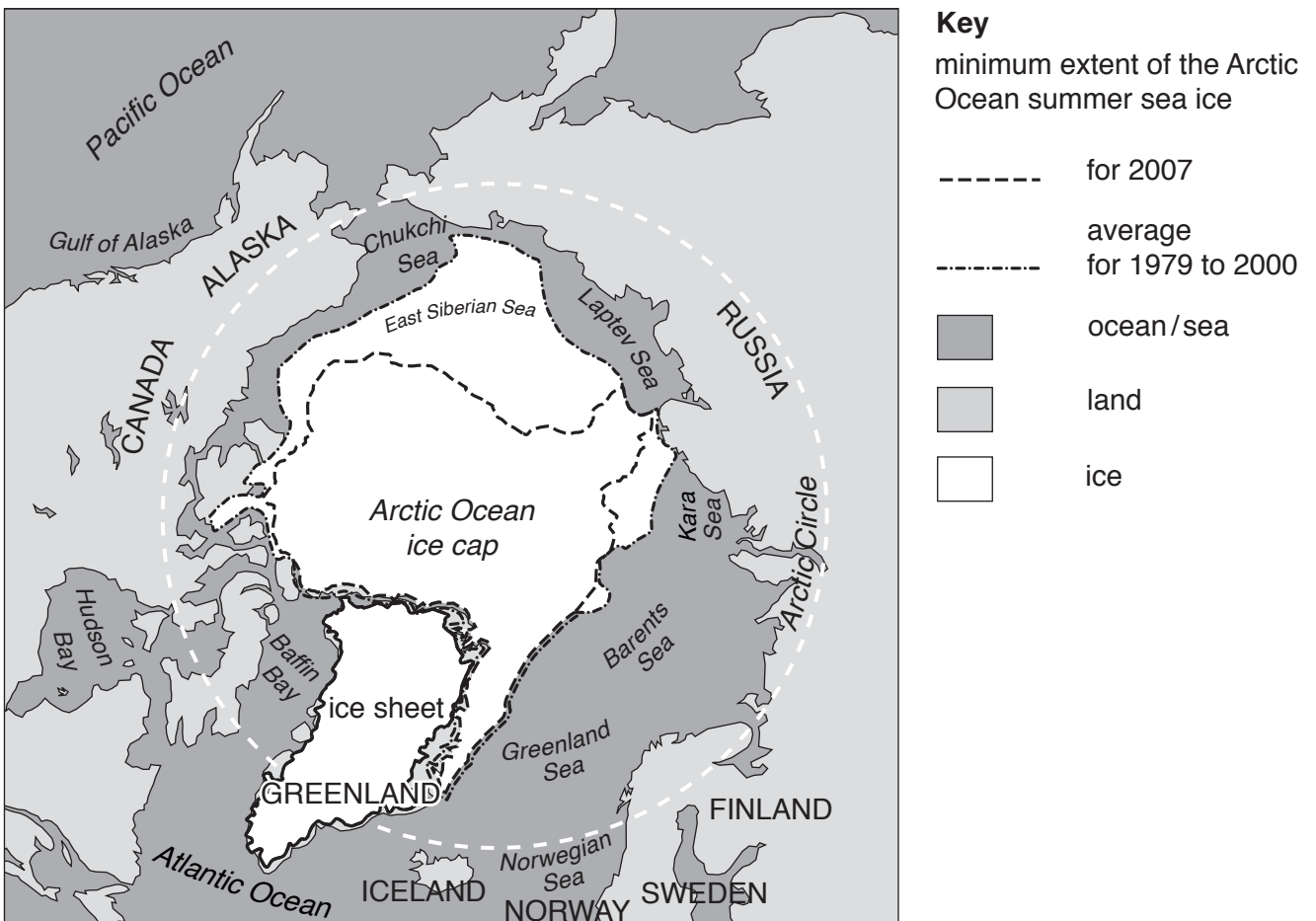
This document consists of **13** printed pages and **3** blank pages.

**Section A**

Answer **all** questions in this section.

Write your answers in the spaces provided.

- 1 (a) Fig. 1.1 shows the minimum extent of Arctic Ocean summer sea ice in 2007 compared to the average for 1979 to 2000.



**Fig. 1.1**

- (i) With reference to Fig. 1.1, describe the difference between the minimum extent of Arctic Ocean summer sea ice average for 1979 to 2000 and that for 2007.

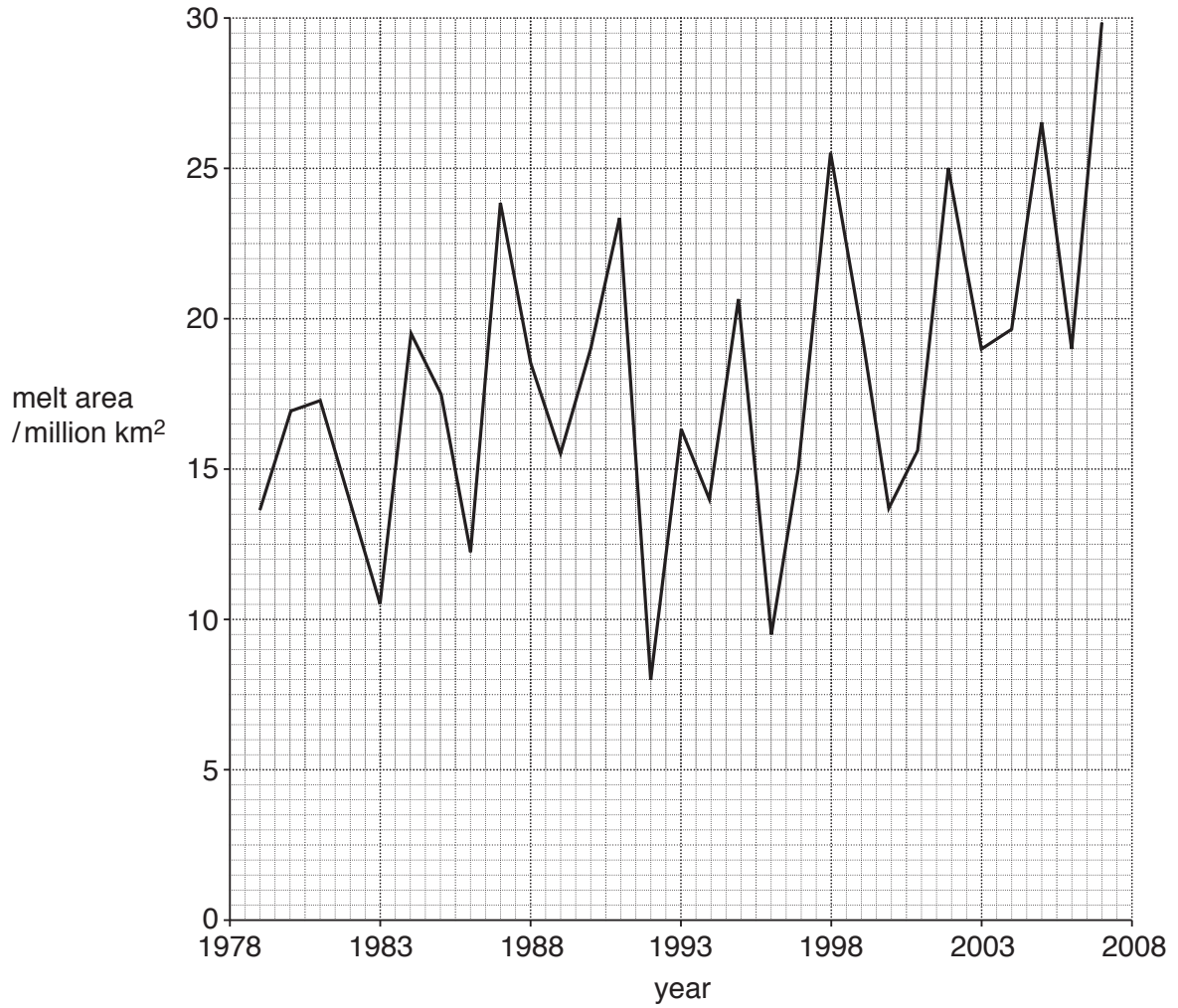
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Fig. 1.2 shows the summer Greenland ice sheet melt area, in million km<sup>2</sup>, between 1979 and 2007.



**Fig. 1.2**

(ii) With reference to Fig. 1.2, describe the trend in the melt area between 1979 and 2007.

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(iii) Explain the impact of global warming on the size of the main storage zones of water. Refer to Fig. 1.1 and Fig. 1.2 in your answer.

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[5]

(b) The Thames Barrier, in the United Kingdom, is a barrage built to protect London from tidal surges. Fig. 1.3 shows the location of the Thames Barrier and some other barriers.

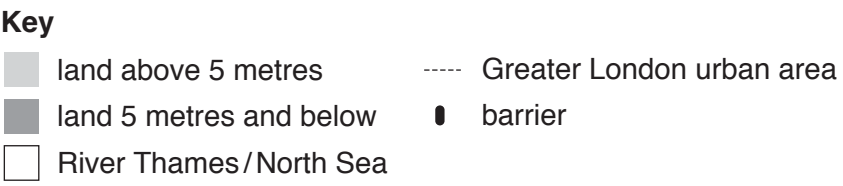
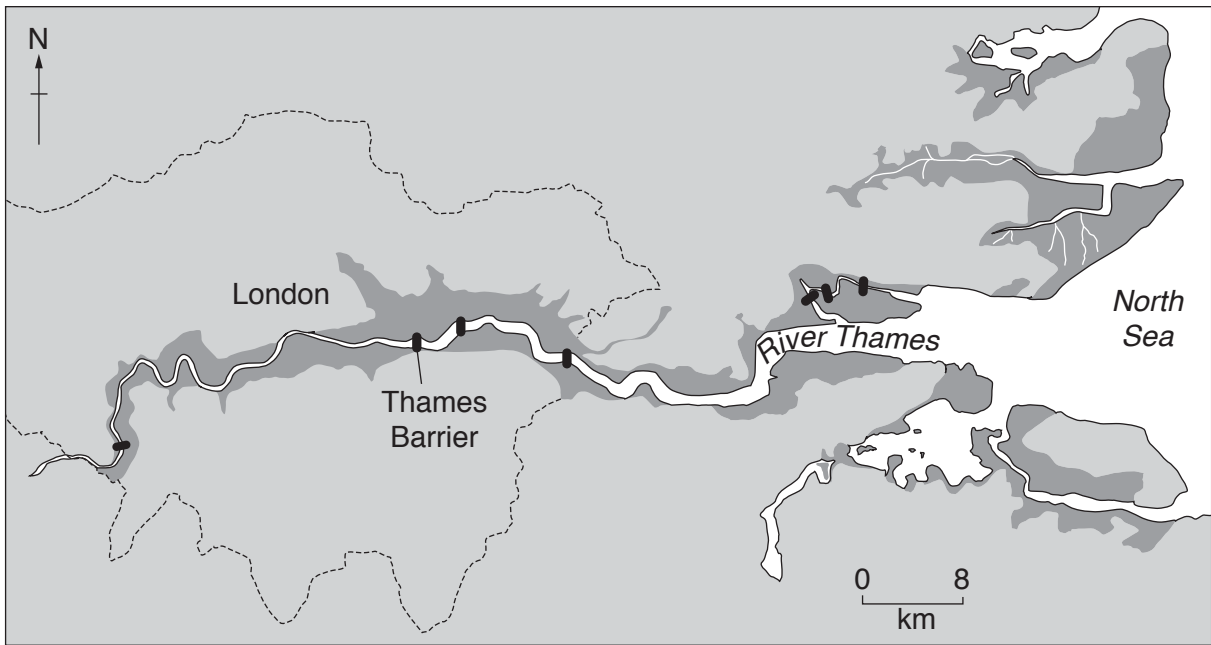
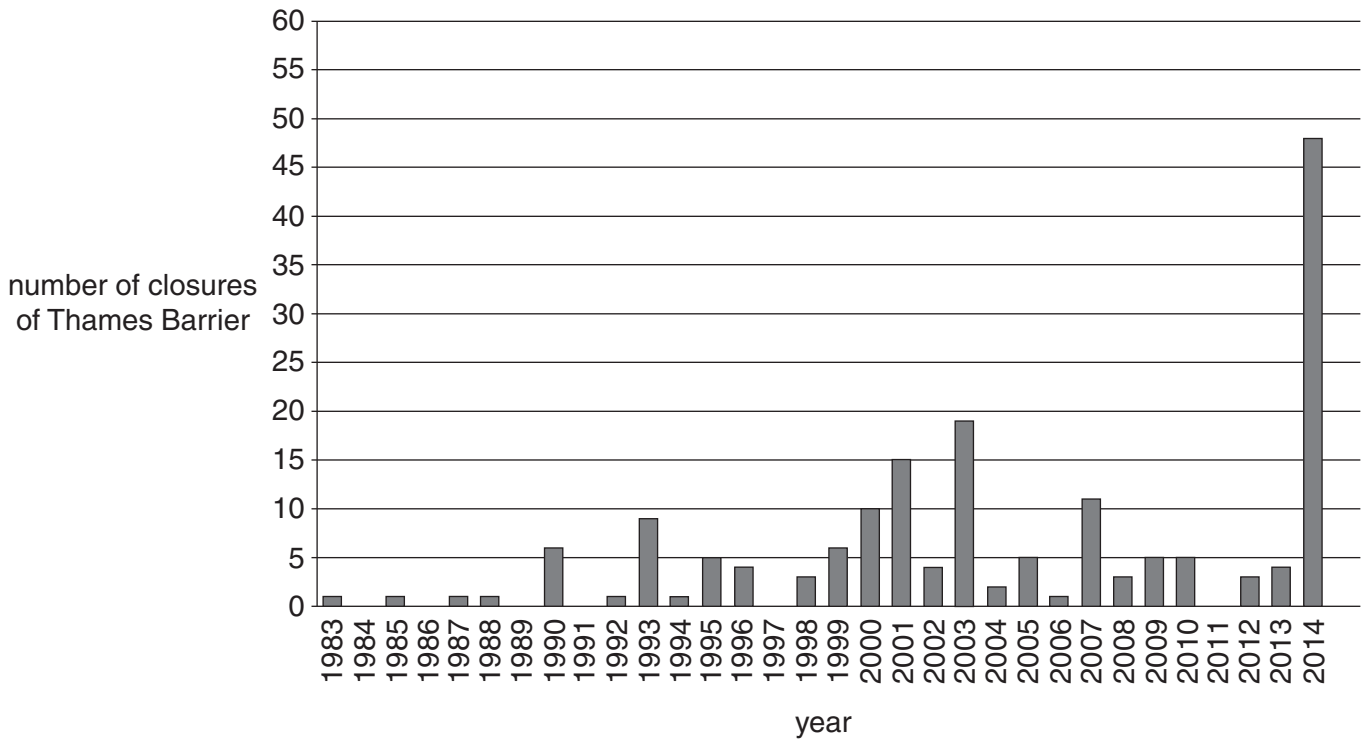


Fig. 1.3

Fig. 1.4 shows the number of closures of the Thames Barrier between 1983 and 2014.



**Fig. 1.4**

- (i) Describe the changes in the number of closures of the Thames Barrier between 1983 and 2014 as shown by Fig. 1.4.

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- (ii) Using Fig. 1.3 and Fig. 1.4, evaluate the advantages and disadvantages of barrages such as the Thames Barrier.

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[Total: 20]

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- 2 (a) Fig. 2.1 shows a succession developing near Mount Vesuvius, an active volcano in Europe. Fig. 2.2 shows the changes in biomass, primary productivity and biodiversity during succession.

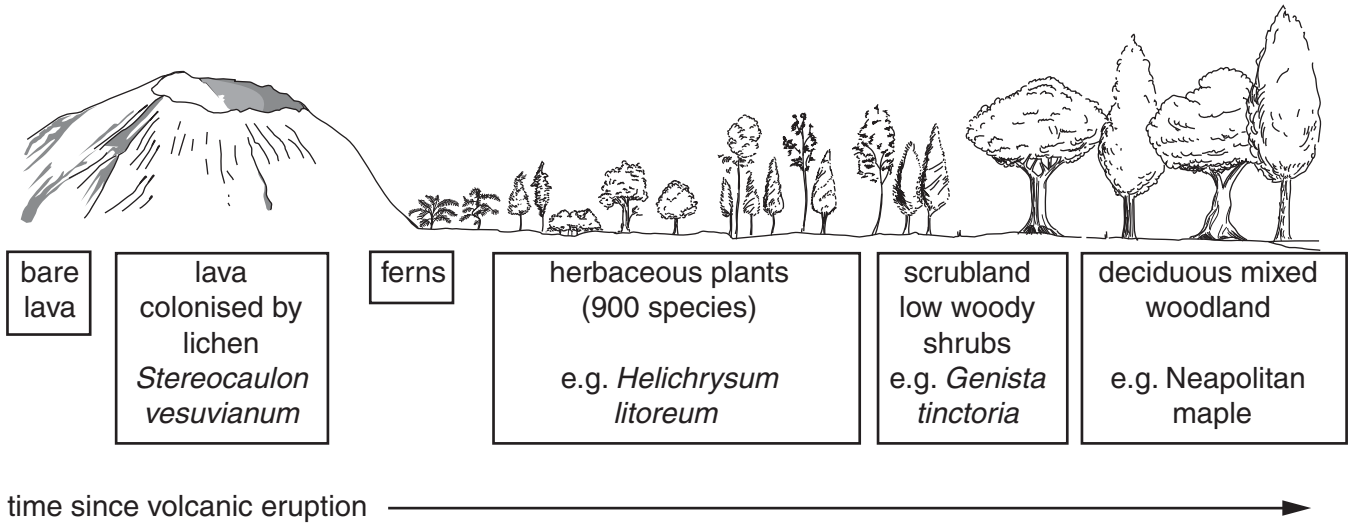


Fig. 2.1

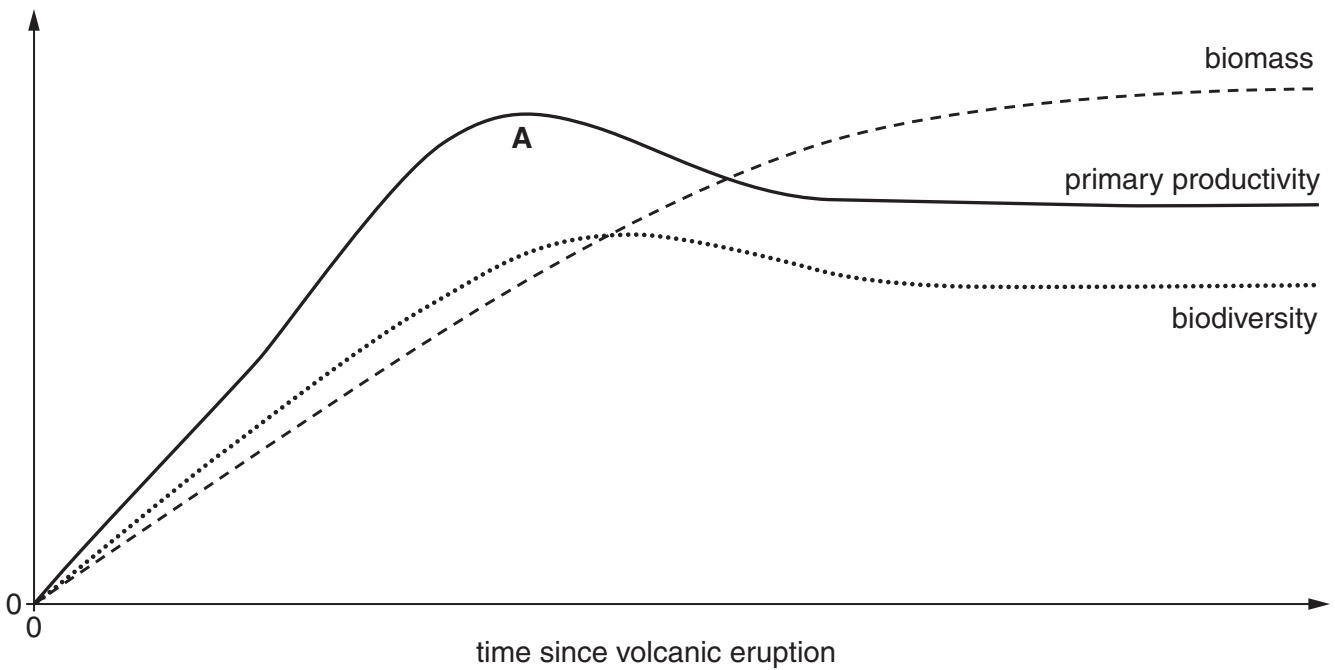


Fig. 2.2

- (i) With reference to Fig. 2.1, outline what is meant by the term *succession*.

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(ii) With reference to Fig. 2.1 and Fig. 2.2, describe and explain the changes in biomass and biodiversity during succession.

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(iii) Explain why the primary productivity in the succession is highest at point **A** in Fig. 2.2.

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(b) The Vesuvius National Park was established in 1995 to protect this active volcanic area in Europe. Fig. 2.3 shows some features of this national park.

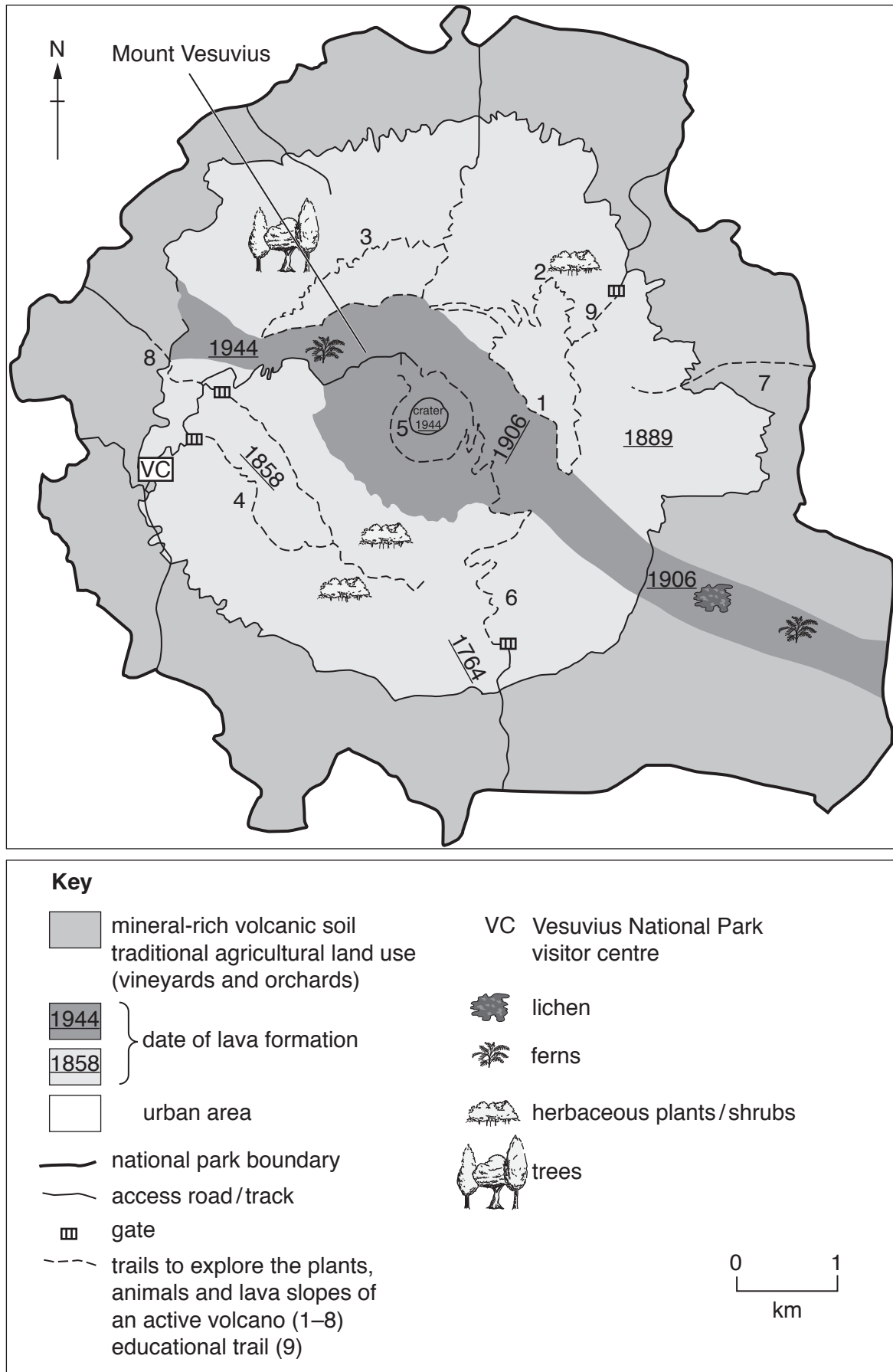


Fig. 2.3

- (i) Suggest **one** reason why different stages of succession can be found in different areas within the Vesuvius National Park.

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- (ii) Explain the role of national parks in the preservation and conservation of the environment. Include information from Fig. 2.3 in your answer.

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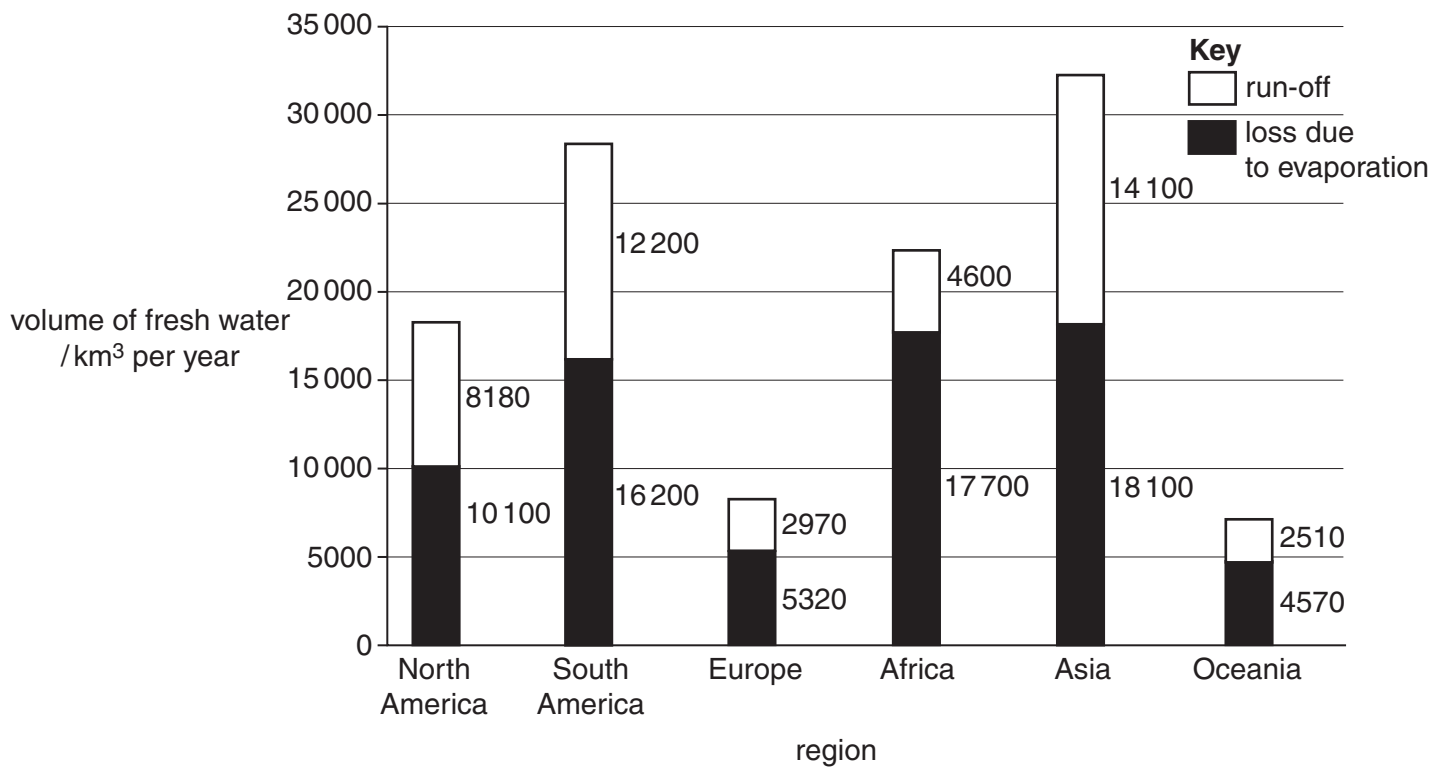
[Total: 20]

## Section B

Select **one** question from this section.

Write your answers on the separate answer paper provided.

- 3 Fig. 3.1 shows the volume of freshwater resources available for different regions from surface water as run-off and losses due to evaporation.

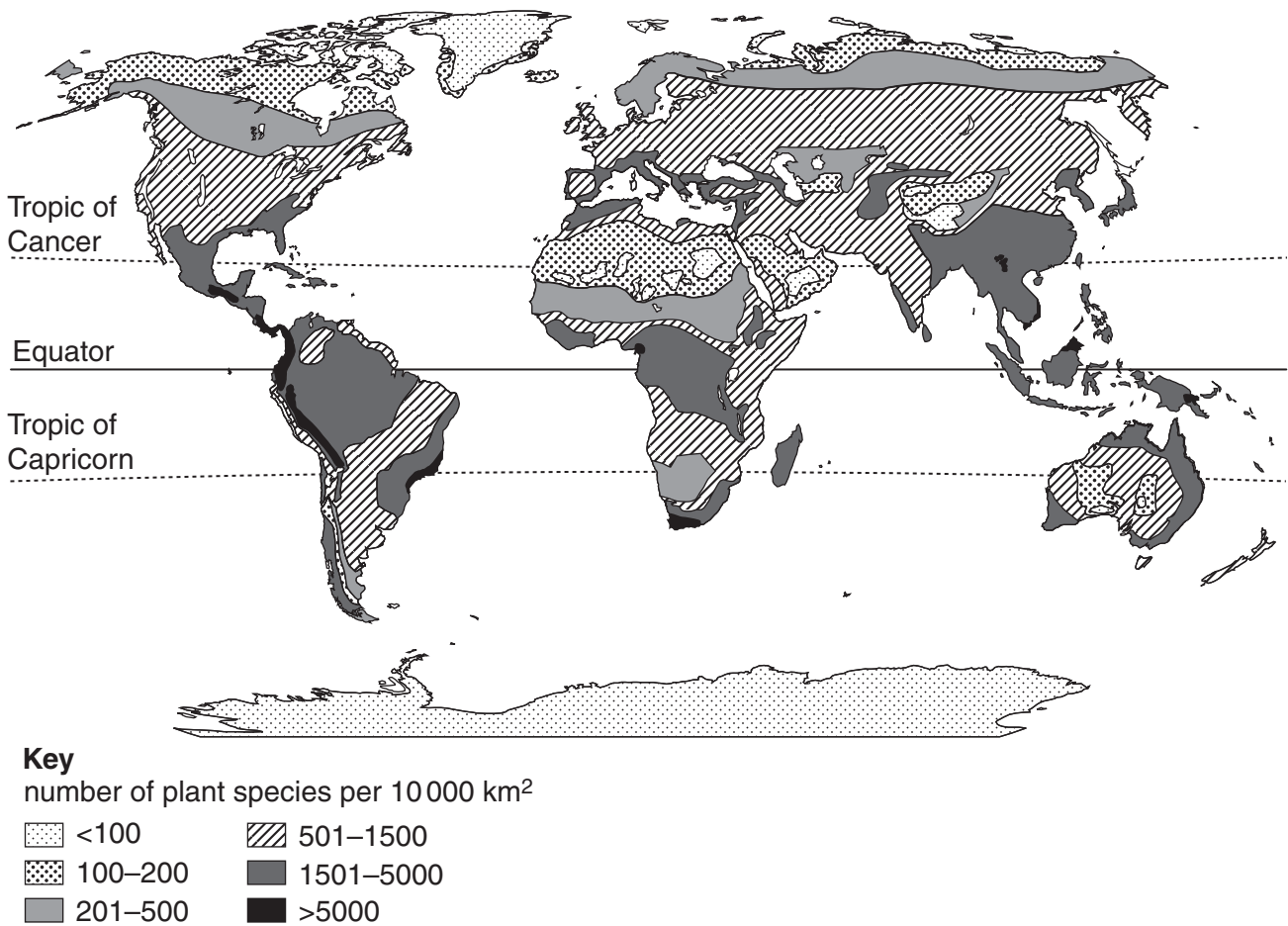


**Fig. 3.1**

- (a) With reference to Fig. 3.1, describe and suggest reasons for the regional differences in the supply of fresh water from run-off. [10]
- (b) With reference to countries at different levels of economic development, describe ways in which increasing water demands are being met. Assess the impact of growing demand upon the natural supplies of water. [30]

[Total: 40]

- 4 Fig. 4.1 shows the global distribution of biodiversity as indicated by the number of species of plants per 10 000 km<sup>2</sup>.

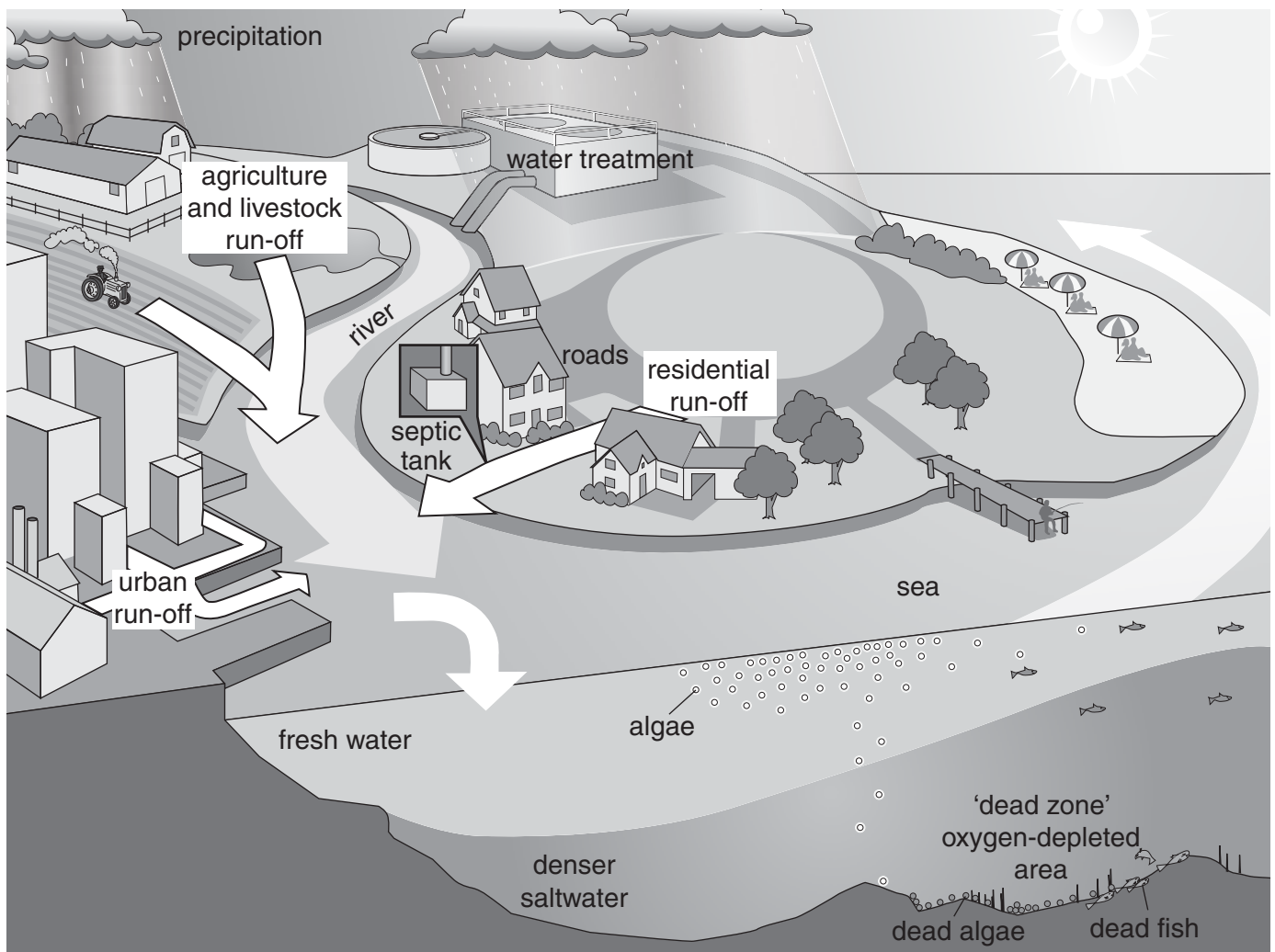


**Fig. 4.1**

- (a) With reference to Fig. 4.1, describe and explain the patterns shown in the global distribution of biodiversity. [10]
- (b) Both natural and human factors influence the biodiversity of ecosystems. Using examples, assess to what extent methods used in ecosystem management are effective in maintaining this biodiversity. [30]

[Total: 40]

- 5 Fig. 5.1 shows how human activity can lead to pollution and result in the formation of a 'dead zone' (an area of water with a depleted oxygen concentration).



**Fig. 5.1**

- (a) With reference to Fig. 5.1, explain how a 'dead zone' (an area of water with a depleted oxygen concentration) can form as a result of pollution from human activity. [10]
- (b) With reference to pollutants from both land and marine sources, evaluate management strategies that are aimed at reducing the pollution of marine environments. [30]

[Total: 40]



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